[METRIC]
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SUPERSEDING
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COMMERCIAL ITEM DESCRIPTION

IRON OXIDE, BLACK, TECHNICAL

The General Services Administration has authorized the use of this commercial item description by all federal agencies.

1. SCOPE. This commercial item description covers one class of technical grade, black iron (II, III) (ferroso-ferric) oxide (Fe_3O_4) intended for use in pyrotechnic mixtures. This is a modified commercial item.

2. SALIENT CHARACTERISTICS

2.1 Characteristics. Iron oxide shall conform to the chemical and granulation characteristics of Table I.

TABLE I. Chemical and granulation characteristics.

Characteristic	Minimum	Maximum	Test requirement
Moisture, percent by weight	---	0.20	ASTM D280, Method A
Metallic iron, percent by weight	---	1.00	2.2.1
Ferrous ion (Fe++), percent by weight	22.0	35.9	ASTM D3872
Total iron, percent by weight	69.0	---	2.2.2
Granulation, percent by weight passing U.S. Sieve No. 80 (180 µm)	99.0	---	ASTM B214

Beneficial comments, recommendations, additions, deletions, clarifications, etc., and any other data which may improve this document should be sent by letter to: Defense Supply Center Richmond (DSCR), ATTN: DSCR-VBD, 8000 Jefferson Davis Highway, Richmond, VA 23297-5610.

AMSC N/A FSC 6810

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

2.2 Tests. Water, in accordance with ASTM D1193, and reagent grade chemicals shall be used throughout the tests. Where applicable, blank determinations shall be run and corrections applied where significant. Tests shall be conducted as specified in table I and as follows:

2.2.1 Metallic iron.

2.2.1.1 Zimmerman-Reinhardt reagent. Dissolve 51 grams (g) of manganous sulfate, monohydrate ($MnSO_4 \cdot H_20$) in 300 milliliters (mL) of water. Add a cooled solution of 130 mL of concentrated sulfuric acid in 300 mL of water and 138 mL of concentrated phosphoric acid. Dilute to 1 liter with water.

2.2.1.2 Procedure. Weigh to the nearest 0.1 milligram (mg) approximately 2 g of the specimen into a 250-mL Erlenmeyer flask. Add 3 g of mercuric chloride, displace the air from the flask with a continuous flow of carbon dioxide and add 100 mL of boiling water. Place on a steam bath for 10 minutes and agitate frequently while continuing the flow of carbon dioxide. Remove from the steam bath, cool to room temperature, and discontinue the flow of carbon dioxide. Filter, and wash the residue with water, catching the filtrate and washings in a beaker containing 25 mL of Zimmerman-Reinhardt reagent, prepared as specified in 2.2.1.1, and 350 mL of water. Titrate immediately with 0.1*N* potassium permanganate solution. Calculate the percent by weight metallic iron as follows:

$$\text{Percent by weight metallic iron} = \frac{5.585AB}{W}$$

where: A = Milliliters of potassium permanganate solution used,
B = Normality of potassium permanganate solution, and
W = Weight of specimen, in grams

2.2.2 Total iron. Weigh to the nearest 0.1 mg approximately 0.2 g of the specimen into a porcelain crucible weighed to the nearest 0.1 mg. Ignite at dull red heat for at least 1 hour. Cool to room temperature, add 5 mL of concentrated hydrochloric acid, cover with a watch glass, and place on a steam bath. As the characteristic yellow color of ferric chloride forms, decolorize by adding dropwise, and with stirring, a solution made by dissolving 50 g of stannous chloride, dihydrate ($SnCl_2 \cdot 2H_20$) in 100 mL of concentrated hydrochloric acid and diluting to l liter with water. (Note: a large excess of stannous chloride leads to the formation of black compounds which spoil the analysis, or to excessive amounts of mercurous chloride which leads to high results. If the proper amount of stannous chloride has been added, a slightly silky precipitate of mercurous chloride is obtained.) Continue the dropwise addition of the stannous chloride solution as the ferric chloride color forms until all of the specimen is dissolved and the solution is completely decolorized. Add one or two drops of the stannous chloride solution in excess. Remove from the steam bath, cool to room temperature, and add at one stroke, 15 mL of 10-percent mercuric chloride solution. Allow to stand for 2 minutes covered with a watch glass. Wash the contents of the crucible into a beaker containing 25 mL of Zimmerman-Reinhardt

reagent, prepared as specified in 2.2.1.1, and 400 mL of water. Titrate immediately with a 0.1*N* potassium permanganate solution. Calculate the percent by weight total iron as follows:

$$\text{Percent by weight total iron} = \frac{5.585AB}{W}$$

where: A = Milliliters of potassium permanganate solution used,
B = Normality of potassium permanganate solution, and
W = Weight of specimen, in grams.

3. REGULATORY REQUIREMENTS

3.1 Marking, packaging, and labeling. Material shall be labeled, packed, and marked in accordance with Title 49, Code of Federal Regulations (CFR), paragraphs 100 to 185.

3.2 Recycled materials. The offeror/contractor is encouraged to use recovered materials to the maximum extent practical, in accordance with paragraph 23.403 of the Federal Acquisition Regulation (FAR).

3.3 Material safety data sheet (MSDS). An MSDS shall be prepared and furnished in accordance with 29 CFR 1910.1200 and submitted as directed in the contract or order at the time of acquisition award.

4. QUALITY ASSURANCE PROVISIONS

4.1 Product conformance. The product provided shall meet the salient characteristics of this commercial item description, conform to the producer's own drawings, specifications, standards, and quality assurance practices, and be the same product offered for sale in the commercial market. The Government reserves the right to require proof of such conformance.

4.2 Market acceptability. The item offered must have been sold to the Government or commercial market.

5. PACKAGING. Preservation, packing, and marking shall be as specified in the contract or order.

6. NOTES

(This section contains information of a general or explanatory nature which is helpful, but is not mandatory.)

6.1 Source of documents.

6.1.1 Copies of the Code of Federal Regulations (CFR) and Federal Acquisition Regulation (FAR) may be obtained from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402-0001.

6.1.2 Copies of American Society for Testing and Materials (ASTM) standards may be obtained from the American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

6.2 Ordering data. Acquisition documents must specify the following:

a. Title, number, and date of this CID.

b. Unit of issue and quantity required.

c. Packaging requirements (see 5).

6.3 Significant figures. For the purpose of determining conformance with this commercial item description, an observed or calculated value should be rounded off "to the nearest unit" in the right-hand place of figures used in expressing the limiting value, in accordance with the rounding-off method of ASTM E29.

6.4 National stock number (NSN). The following NSN corresponds to this CID: 6810-01-117-4486. This may not be indicative of all possible NSNs for this document.

6.5 Subject term (key word) listing.

Ferrous oxide
Metallic iron
Pyrotechnics
Total iron

MILITARY INTERESTS:

Custodians
Army - EA
Navy - OS

Reviewers
Army - AR, MD1
Navy - AS

CIVIL AGENCY
COORDINATING ACTIVITY:

GSA - 10FTE

Preparing Activity:
DLA - GS

(Project 6810-1600)